

## CLAIMS

1. (Canceled)
2. (Currently amended) The frequency domain equalization system of claim 1 ~~wherein said the~~ complex signal comprises 52 complex subcarriers.
3. (Currently amended) ~~A~~ The frequency domain equalization system of claim 2 to compensate for wireless communication time-constant and time-varying channel effects, residual carrier frequency offset, and sampling frequency offset arising in a received complex signal comprising:
  - an equalizer tap calculation circuit cooperating with an equalizer tap tracking circuit to correct the time-constant and time-varying channel effects;
  - a phase tracking circuit to correct the residual carrier frequency offset; and
  - a timing tracking circuit to correct the sampling frequency offset;
  - where the received complex signal is inputted from a Fast Fourier Transform (FFT) circuit and a corrected complex signal is outputted to a soft decision demapper;
  - where the equalizer tap calculation circuit is configured to generate a corrective tap signal to use in correcting the complex signal;
  - where pilot signals are extracted for use in the phase and timing tracking circuits;
  - where the complex signal comprises 52 complex subcarriers; and
  - wherein said the corrective tap signal is generated by applying a sign least mean squares algorithm to ~~said the~~ 52 complex subcarriers.
4. (Currently amended) The frequency domain equalization system of claim 3 wherein ~~said the~~ equalizer tap tracking circuit further includes a slicer and wherein ~~said the~~ equalizer tap tracking circuit updates ~~said the~~ corrective tap signal with a running time average of a slicer error.
5. (Currently amended) ~~A~~ The frequency domain equalization system of claim 1 to compensate for wireless communication time-constant and time-varying channel effects, residual

carrier frequency offset, and sampling frequency offset arising in a received complex signal comprising:

an equalizer tap calculation circuit cooperating with an equalizer tap tracking circuit to correct the time-constant and time-varying channel effects;

a phase tracking circuit to correct the residual carrier frequency offset; and

a timing tracking circuit to correct the sampling frequency offset;

where the received complex signal is inputted from a Fast Fourier Transform (FFT) circuit and a corrected complex signal is outputted to a soft decision demapper;

where the equalizer tap calculation circuit is configured to generate a corrective tap signal to use in correcting the complex signal;

where pilot signals are extracted for use in the phase and timing tracking circuits; and

wherein respective corrective tap signals are calculated for each subcarrier associated with said the received complex signal.

6. (Currently amended) A The frequency domain equalization system of claim 1 to compensate for wireless communication time-constant and time-varying channel effects, residual carrier frequency offset, and sampling frequency offset arising in a received complex signal comprising:

an equalizer tap calculation circuit cooperating with an equalizer tap tracking circuit to correct the time-constant and time-varying channel effects;

a phase tracking circuit to correct the residual carrier frequency offset; and

a timing tracking circuit to correct the sampling frequency offset;

where the received complex signal is inputted from a Fast Fourier Transform (FFT) circuit and a corrected complex signal is outputted to a soft decision demapper;

where the equalizer tap calculation circuit is configured to generate a corrective tap signal to use in correcting the complex signal;

where pilot signals are extracted for use in the phase and timing tracking circuits; and

wherein said the equalizer tap calculation circuit ~~also performs~~ is configured to perform spectral smoothing.

7. (Currently amended) The frequency domain equalization system of claim 1 5 wherein said timing tracking circuit tracks the phases of said pilot signals using time averaging.

8. (Currently amended) ~~A~~ The frequency domain equalization system of claim 2 to compensate for wireless communication time-constant and time-varying channel effects, residual carrier frequency offset, and sampling frequency offset arising in a received complex signal comprising:

an equalizer tap calculation circuit cooperating with an equalizer tap tracking circuit to correct the time-constant and time-varying channel effects;

a phase tracking circuit to correct the residual carrier frequency offset; and

a timing tracking circuit to correct the sampling frequency offset;

where the received complex signal is inputted from a Fast Fourier Transform (FFT) circuit and a corrected complex signal is outputted to a soft decision demapper;

where the equalizer tap calculation circuit is configured to generate a corrective tap signal to use in correcting the complex signal;

where pilot signals are extracted for use in the phase and timing tracking circuits;

where the complex signal comprises 52 complex subcarriers; and

wherein a respective phase and timing rotor is applied to said pilots and said the 52 complex subcarriers for correction of said to correct the received complex signal.

9. (Currently amended) ~~A~~ The frequency domain equalization system of claim 1 to compensate for wireless communication time-constant and time-varying channel effects, residual carrier frequency offset, and sampling frequency offset arising in a received complex signal comprising:

an equalizer tap calculation circuit cooperating with an equalizer tap tracking circuit to correct the time-constant and time-varying channel effects;

a phase tracking circuit to correct the residual carrier frequency offset; and

a timing tracking circuit to correct the sampling frequency offset;

where the received complex signal is inputted from a Fast Fourier Transform (FFT) circuit and a corrected complex signal is outputted to a soft decision demapper;

where the equalizer tap calculation circuit is configured to generate a corrective tap signal to use in correcting the complex signal;

where pilot signals are extracted for use in the phase and timing tracking circuits; and  
wherein four pilot signals are calculated.

10. (Currently amended) Δ The frequency domain equalization system of claim 1 to compensate for wireless communication time-constant and time-varying channel effects, residual carrier frequency offset, and sampling frequency offset arising in a received complex signal comprising:

an equalizer tap calculation circuit cooperating with an equalizer tap tracking circuit to correct the time-constant and time-varying channel effects;

a phase tracking circuit to correct the residual carrier frequency offset; and

a timing tracking circuit to correct the sampling frequency offset;

where the received complex signal is inputted from a Fast Fourier Transform (FFT) circuit and a corrected complex signal is outputted to a soft decision demapper;

where the equalizer tap calculation circuit is configured to generate a corrective tap signal to use in correcting the complex signal;

where pilot signals are extracted for use in the phase and timing tracking circuits; and

wherein said the phase tracking circuit is nested within said the timing tracking circuit.

11. (Canceled)

12. (Currently amended) Δ The method of claim 11 for correcting a received complex signal, comprising:

estimating a channel response from long sequence training symbols FFT 1 and FFT 2 contained in a received data packet preamble;

processing pilot tones in each of the FFT 1 and FFT 2 long sequence training symbols to evaluate a carrier frequency offset and a sampling frequency offset;

compensating for the carrier frequency offset or the sampling frequency offset in a subsequently received data packet;

tracking channel distortion during subsequent reception of data packets; and

modifying the channel response to compensate for any detected distortion;  
wherein ~~said step of channel estimation is performed by~~ estimating the channel response  
includes comparing the received amplitude and phase of said the long sequence training symbols  
FFT 1 and FFT 2 with a reference.

13. (Currently amended) The method of claim 12 wherein ~~said step of the~~ comparing  
the received amplitude further comprises includes averaging over said the long sequence training  
symbols FFT 1 and FFT 2 and demodulating each subcarrier associated with said the received  
complex signal.

14. (Currently amended) ~~The method of claim 11~~ for correcting a received  
complex signal, comprising:  
estimating a channel response from long sequence training symbols FFT 1 and FFT 2  
contained in a received data packet preamble;  
processing pilot tones in each of the FFT 1 and FFT 2 long sequence training symbols to  
evaluate a carrier frequency offset and a sampling frequency offset;  
compensating for the carrier frequency offset or the sampling frequency offset in a  
subsequently received data packet;  
tracking channel distortion during subsequent reception of data packets; and  
modifying the channel response to compensate for any detected distortion;  
wherein ~~said step of the~~ estimating further comprises the channel response includes  
producing a corrective tap signal and applying said the corrective tap signal to said the received  
long sequence training symbols FFT 1 and FFT 2.

15. (Currently amended) The method of claim 14 wherein ~~said step of the~~ tracking  
comprises includes refining said the corrective tap signal by tracking residual phase and timing  
error, and channel variations.

16. (Currently amended) The method of claim 14 wherein ~~said step of the~~ estimating  
further comprises includes spectral smoothing.

17. (Currently amended) ~~A~~ The method of claim 11 for correcting a received complex signal, comprising:  
estimating a channel response from long sequence training symbols FFT 1 and FFT 2 contained in a received data packet preamble;  
processing pilot tones in each of the FFT 1 and FFT 2 long sequence training symbols to evaluate a carrier frequency offset and a sampling frequency offset;  
compensating for the carrier frequency offset or the sampling frequency offset in a subsequently received data packet;  
tracking channel distortion during subsequent reception of data packets; and  
modifying the channel response to compensate for any detected distortion;  
wherein said step of the compensating further comprises includes applying respective phase and timing rotators to said the pilots and subcarriers associated with said the received complex signal to correct said the respective carrier frequency and sampling frequency offsets.

18. (Currently amended) The method of claim 17 wherein said step of processing the pilot tones further comprises includes tracking the phase across said the pilot tones using time averaging.

19. (Currently amended) ~~A~~ The method of claim 11 for correcting a received complex signal, comprising:  
estimating a channel response from long sequence training symbols FFT 1 and FFT 2 contained in a received data packet preamble;  
processing pilot tones in each of the FFT 1 and FFT 2 long sequence training symbols to evaluate a carrier frequency offset and a sampling frequency offset;  
compensating for the carrier frequency offset or the sampling frequency offset in a subsequently received data packet;  
tracking channel distortion during subsequent reception of data packets; and  
modifying the channel response to compensate for any detected distortion;  
wherein said step of the processing the pilot tones further comprises includes sampling said the received complex signal at an analogue to digital converter (ADC) with a clock

associated with said the digital receiver and determining a difference in clock frequency between said the digital receiver clock and a clock associated with a transmitter.